

LUNGS

Lecture (5)

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Objectives:

2

- **Basic anatomy, to identify:**
 - ▣ Definition, structure and function of plura.
 - ▣ Borders, surfaces and impressions of lung
- **Clinical anatomy, to define:**
 - ▣ Hemopneumothorax.
 - ▣ Thoracentesis.
 - ▣ Areas for auscultation and percussion.
- **Surface anatomy, to define:**
 - ▣ Pleural lining.
- **Radiology:**
 - ▣ Collapsed lung.
 - ▣ Hemopneumothorax

Think about this

3

- ❑ **Kamal is 22 years old college student, he was brought to the ER of the military hospital in Omdurman following a car accident, he was quite well and told the doctor that he was driving when the accident happened suddenly, on examination there was a minor trauma to the right side of his chest, his pulse rate was 80 bpm, respiratory rate 20 and blood pressure 120/80, after a while he told the resident doctor that he is facing difficulty in breathing, in reassessment his pulse rate became 90 bpm and the blood pressure dropped into 90/60, on auscultation the sounds on the right side were muffled.**

By the end of this lecture, try to answer these questions about the previous story:

4

- ❑ **What is the possible diagnosis?**
- ❑ **Describe the radiological finding?**
- ❑ **Why did the patient feel difficulty in breathing?**
- ❑ **Mention the surface marking for the pleura in both sides.**
- ❑ **What are the differences in the innervation between the visceral and parietal pleurae?**

Introduction: Lecture's map

5

□ Pleura:

- Definition and structure.
- Layers.
- Parts.
- Innervation.
- Function.
- Surface marking.

□ Lungs:

- Roots of the lung.
- Borders and surfaces.
- Lobes and impressions.
- Bronchial tree.
- Blood supply.
- Innervation.

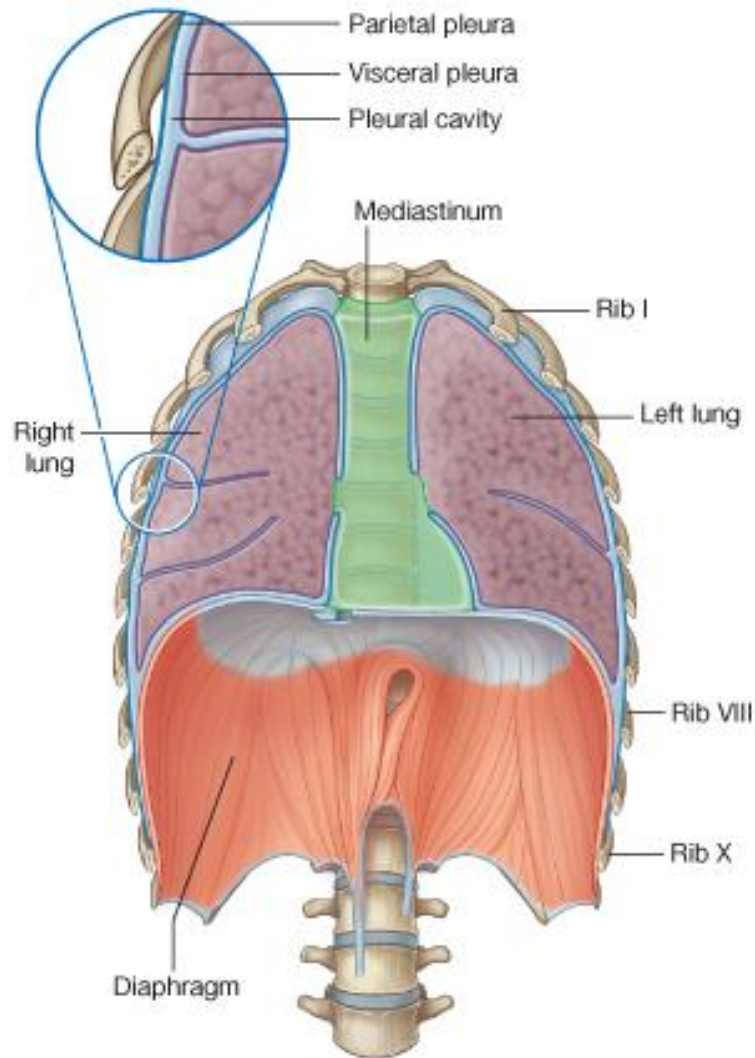
Pleura

6

- ❑ **Definition and structure.**
- ❑ **Layers.**
- ❑ **Parts.**
- ❑ **Innervation.**
- ❑ **Function.**
- ❑ **Surface marking.**

Pleura and Pleural Cavity

7



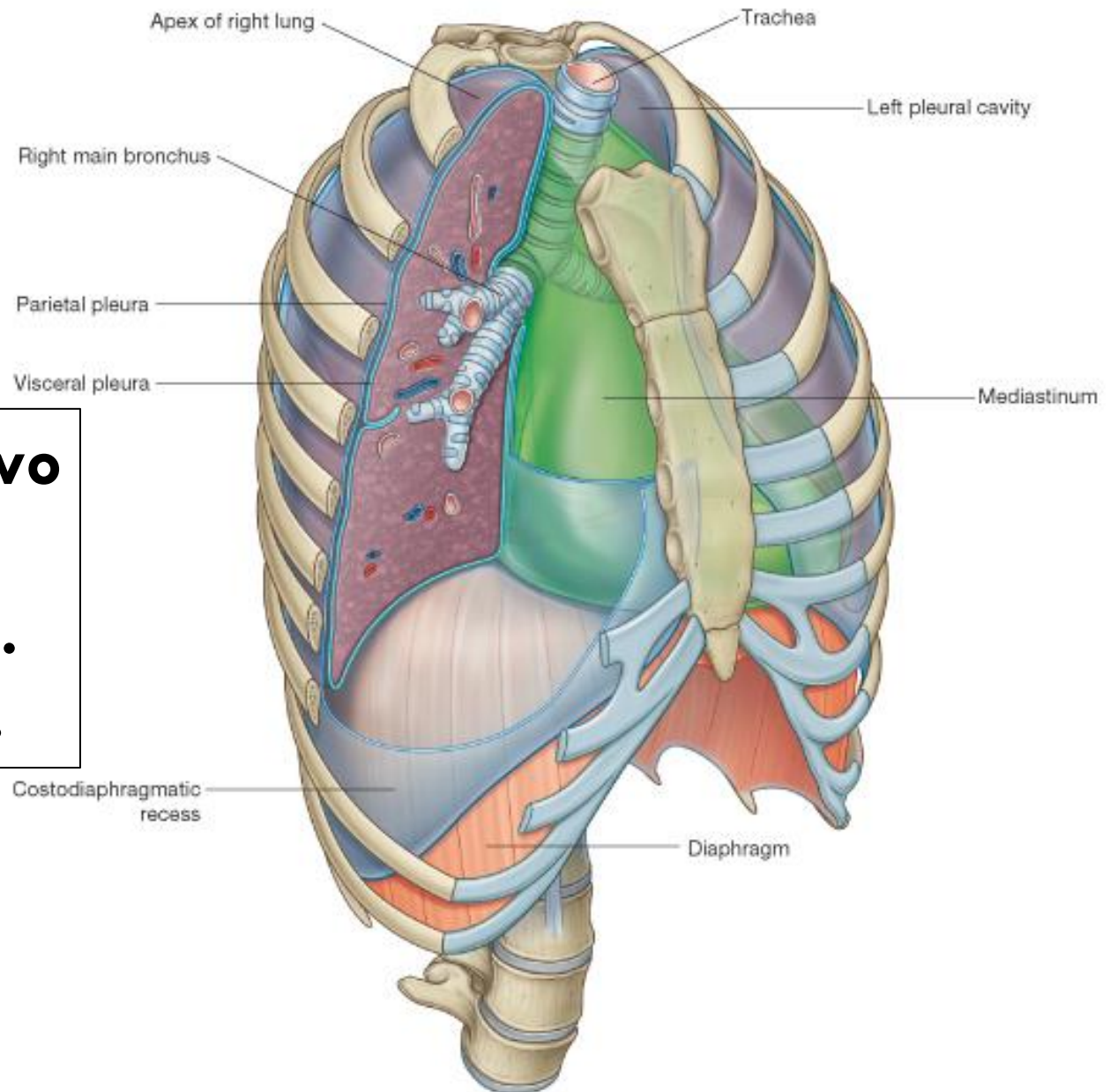
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Pleura: Definition and structure

8

- ❑ **It is a sac that invests the lung.**
- ❑ **Histology: layer of flat epithelium (mesothelium) rests on connective tissue.**

**It consists of two
layers:
Visceral pleura.
Parietal pleura.**



Pleural fluids

10

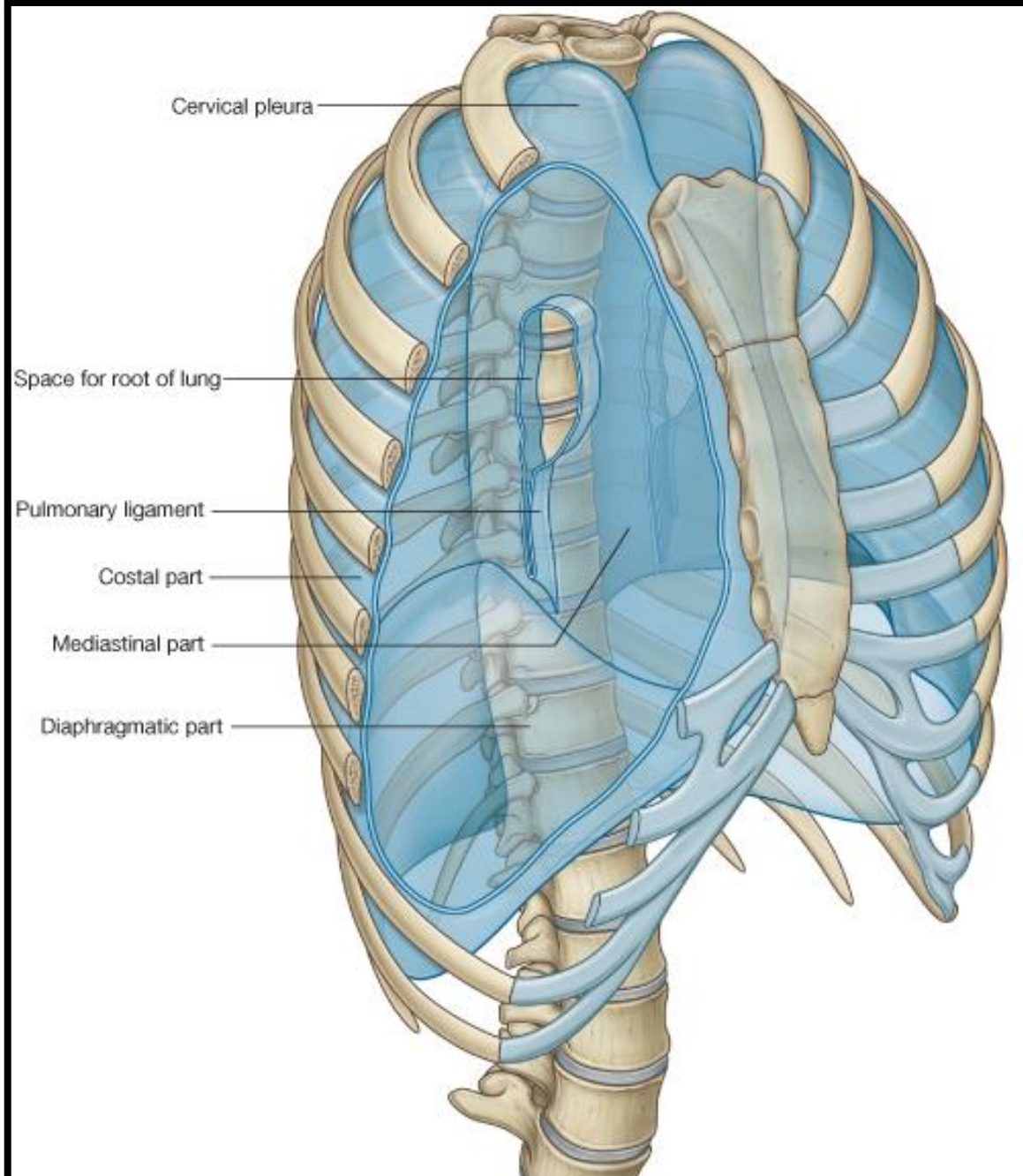
□ the potential space between the layers of pleura contains lubricating film of pleural fluid.

Parts Of Pleura:

Costal

Mediastinal

Diaphragmatic



Costodiaphragmatic recess

12

- **The space between the costal pleura and diaphragmatic pleura.**
- **It is deepest after forced expiration and shallowest after forced inspiration.**

Innervation

13

Part	Nerve supply
Costal pleura	Intercostal nerves
Mediastinal pleura	Phrenic nerve
Diaphragmatic pleura	

Function

14

- **The pleural fluid maintains the surface tension that keeps the surface of the lung applied to the internal surface of the thoracic wall to:**
 - ▣ **Prevent collapse of the open respiratory system.**
 - ▣ **Cause the lungs to expand when the thorax expands for inhalation**

Surface anatomy

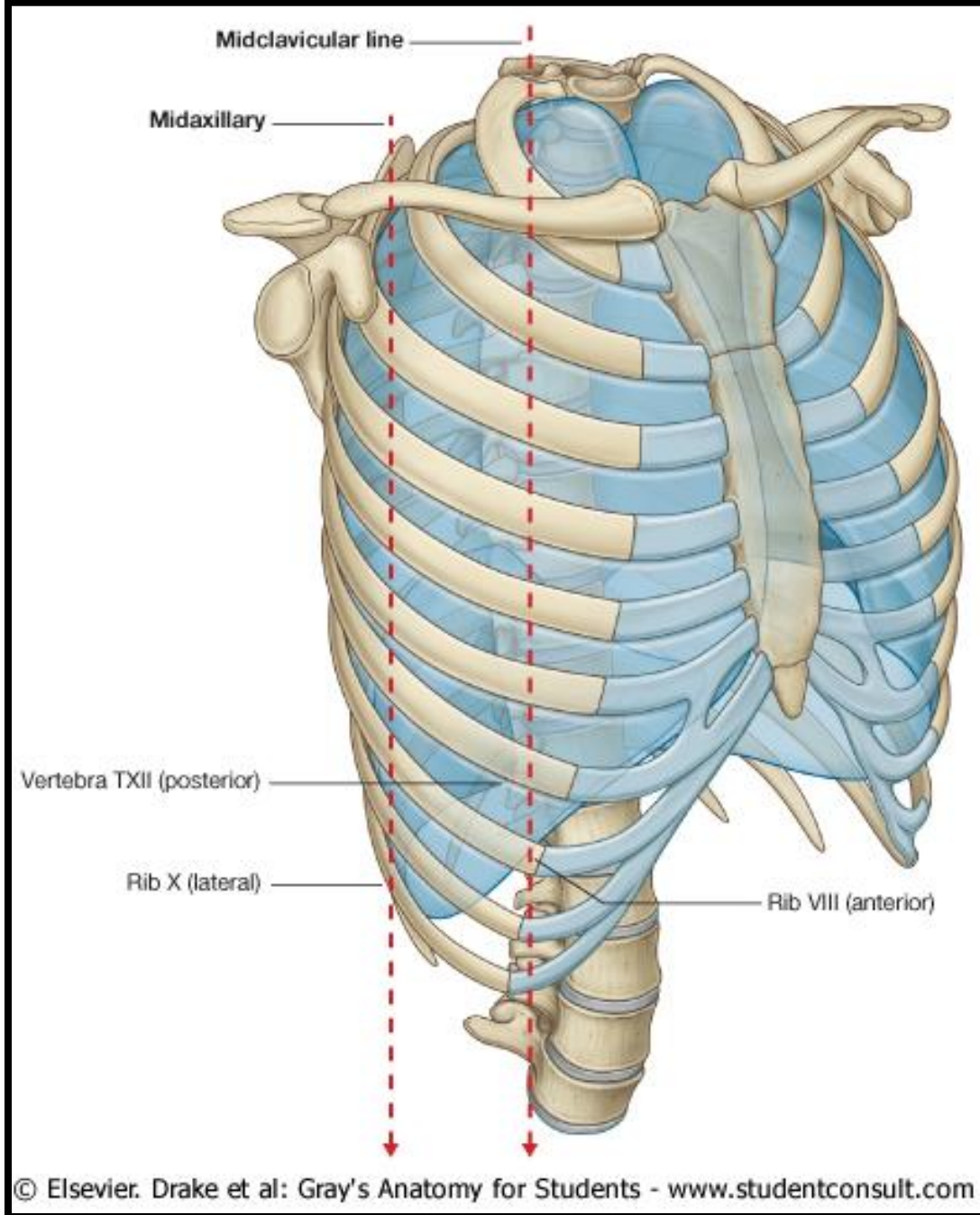
Vertical lines:

Midclavicular line

Midaxillary line

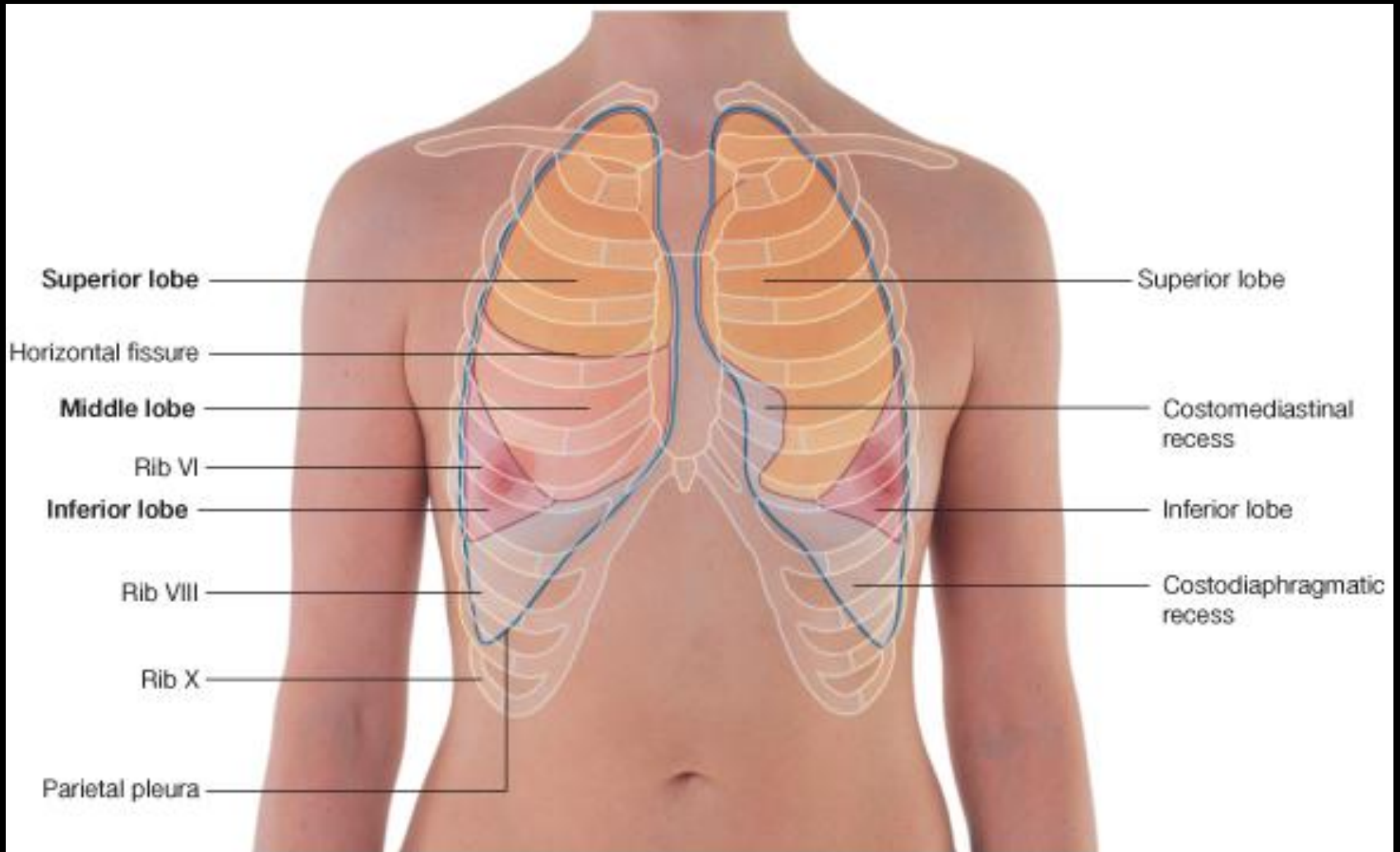
Horizontal lines:

ribs



- **Surface anatomy : anterior view (1):**

Both plural edges pass downwards from behind the sternoclavicular joint to meet in the midline at the 2nd costal cartilage.



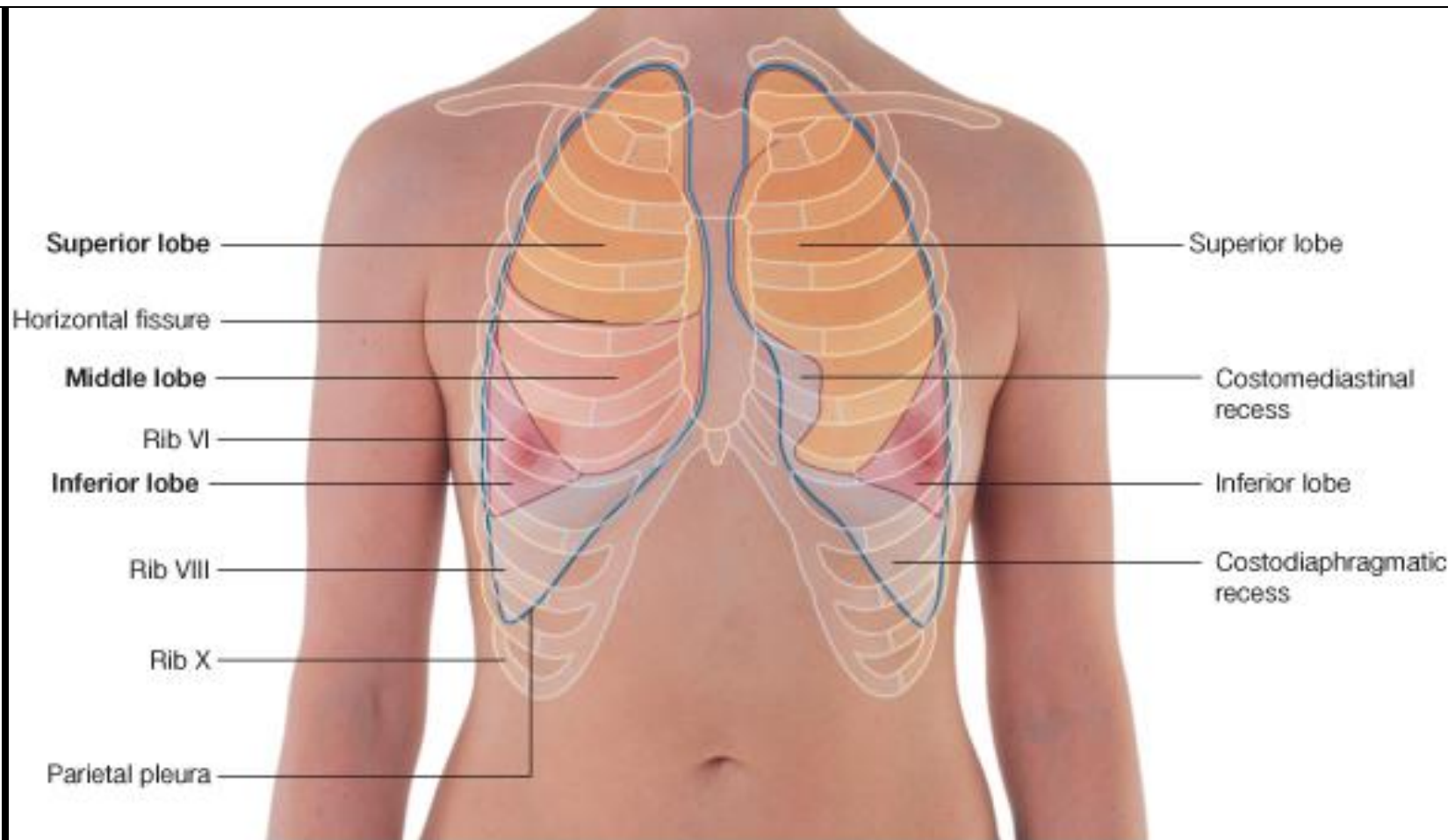
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■ Surface anatomy : anterior view (2):

The pleural edges pass vertically downwards to:

The 6th costal cartilage(right pleura)

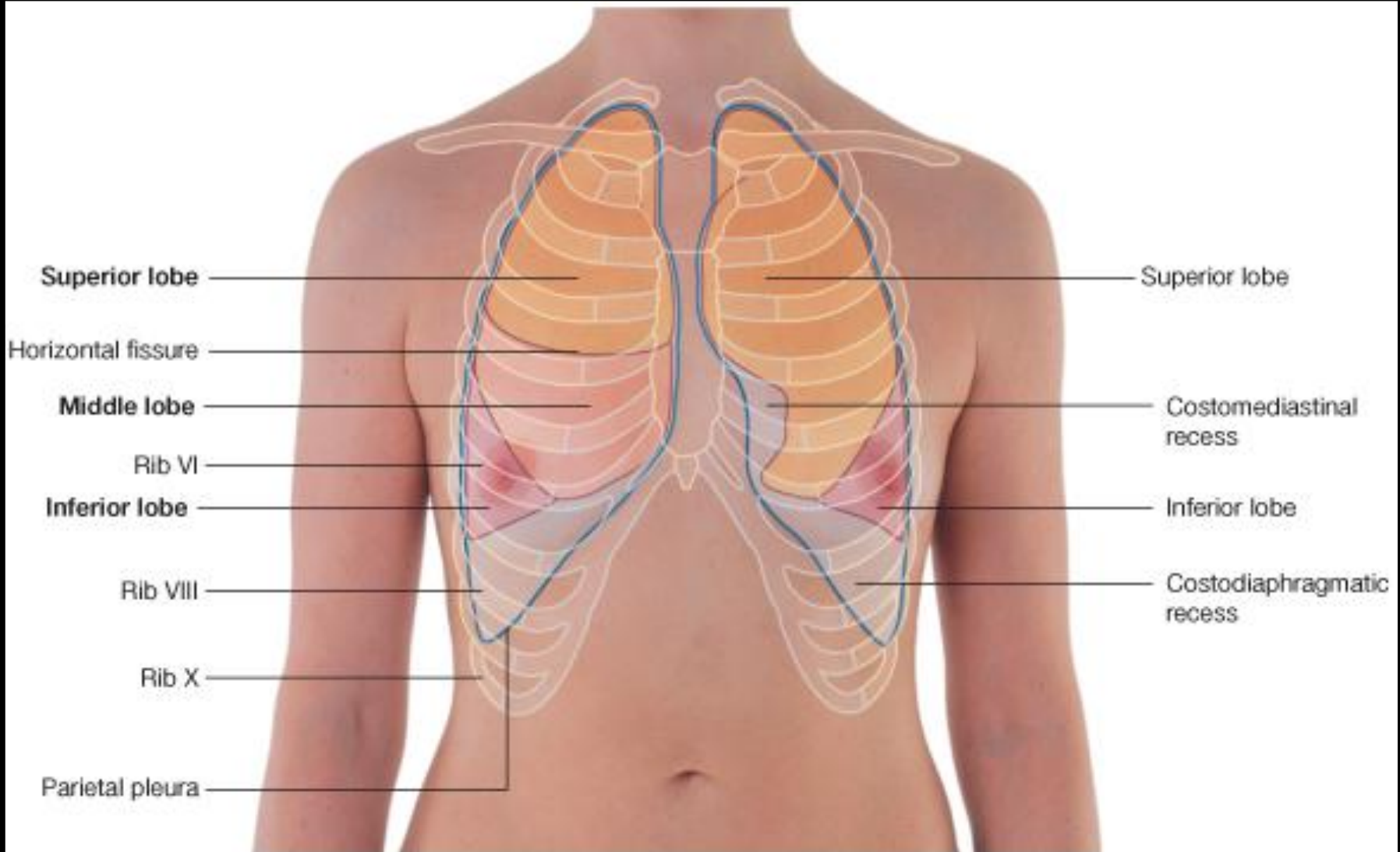
The 4th costal cartilage (left pleura)



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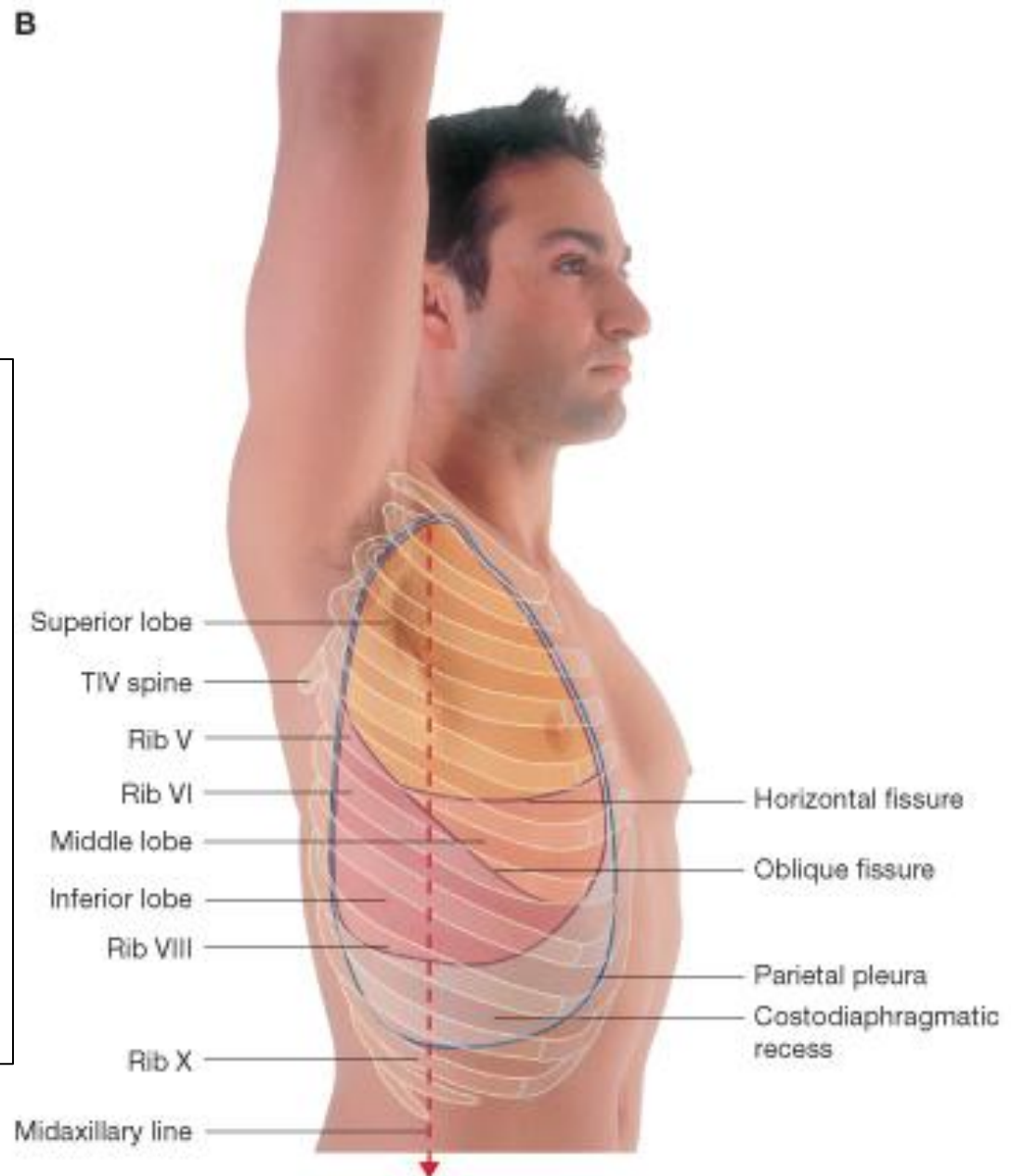
■ **Surface anatomy : anterior view(3):**

The pleural edges cross the 8th rib in the midclavicular line.



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- **Surface anatomy :**
lateral view:
- **The pleural edges cross:**
 - **The 10th rib in the midaxillary line.**
 - **The 12th rib posterolaterally.**



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Clinical note: Hemopneumothorax

20

- **Pneumothorax: Entry of air into the pleural cavity.**
- **Hemothorax: Entry of blood into the pleural cavity.**

X-Ray: Hemopneumothorax



Clinical note: Thoracentesis (1)

22

- **Definition:** to insert a needle through an intercostal space into the pleural cavity, for:
 - **Diagnosis:** to obtain a sample of fluid
 - **Treatment:** to remove blood or pus.

Thoracentesis

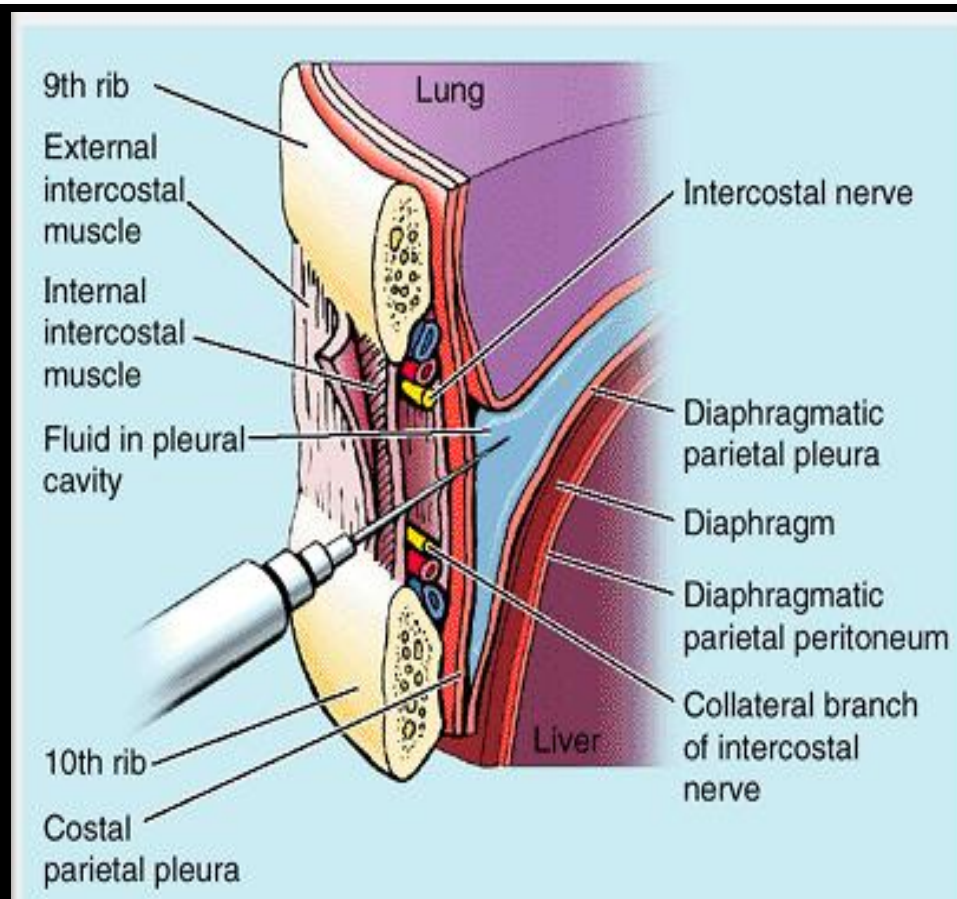
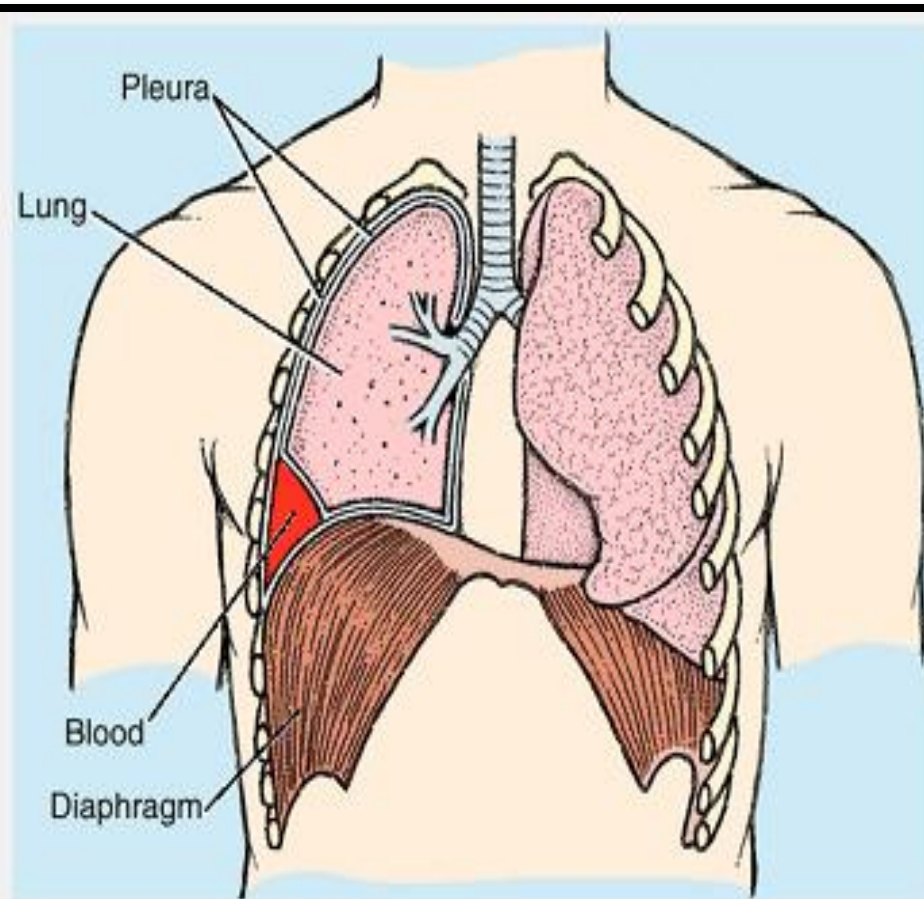


Image from: Moore, Keith L.; Dalley, Arthur F, Clinically Oriented Anatomy, 5th Ed. Lippincott Williams & Wilkins; 2006.

Clinical note: Thoracentesis (2)

24

- **To avoid damage to the intercostal nerve and vessels:**
 - ▣ The needle is inserted superior to the rib.
 - ▣ And high enough to avoid the collateral branches.
- **To avoid damage to the liver:**
 - ▣ The needle should be angled upward.

Lecture's map

25

□ Pleura:

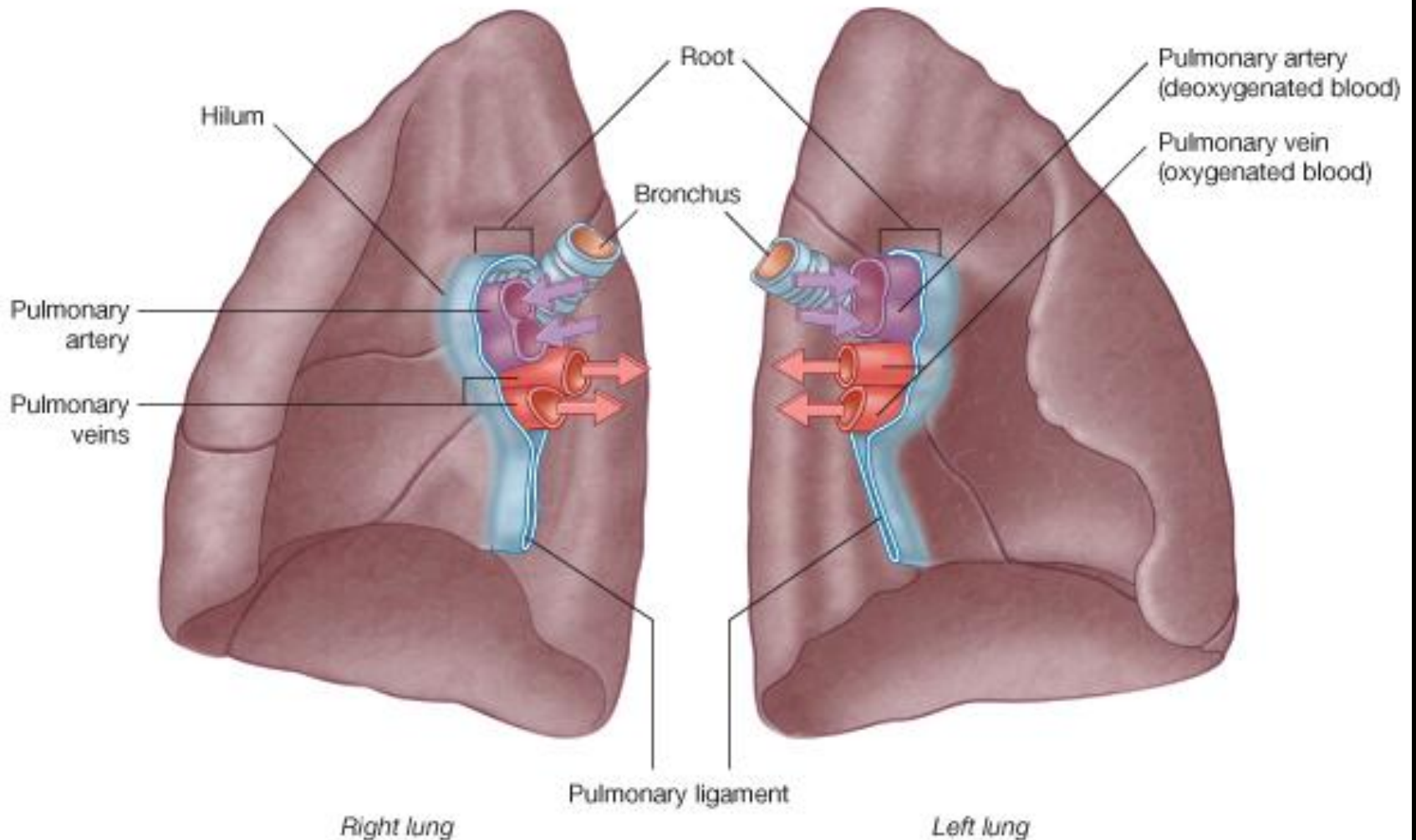
- Definition and structure.
- Layers.
- Parts.
- Innervation.
- Function.
- Surface marking.

□ Lungs:

- **Roots of the lung.**
- **Borders and surfaces.**
- **Lobes and impressions.**
- **Bronchial tree.**
- **Blood supply.**
- **Innervation.**

Lungs

Lung Roots



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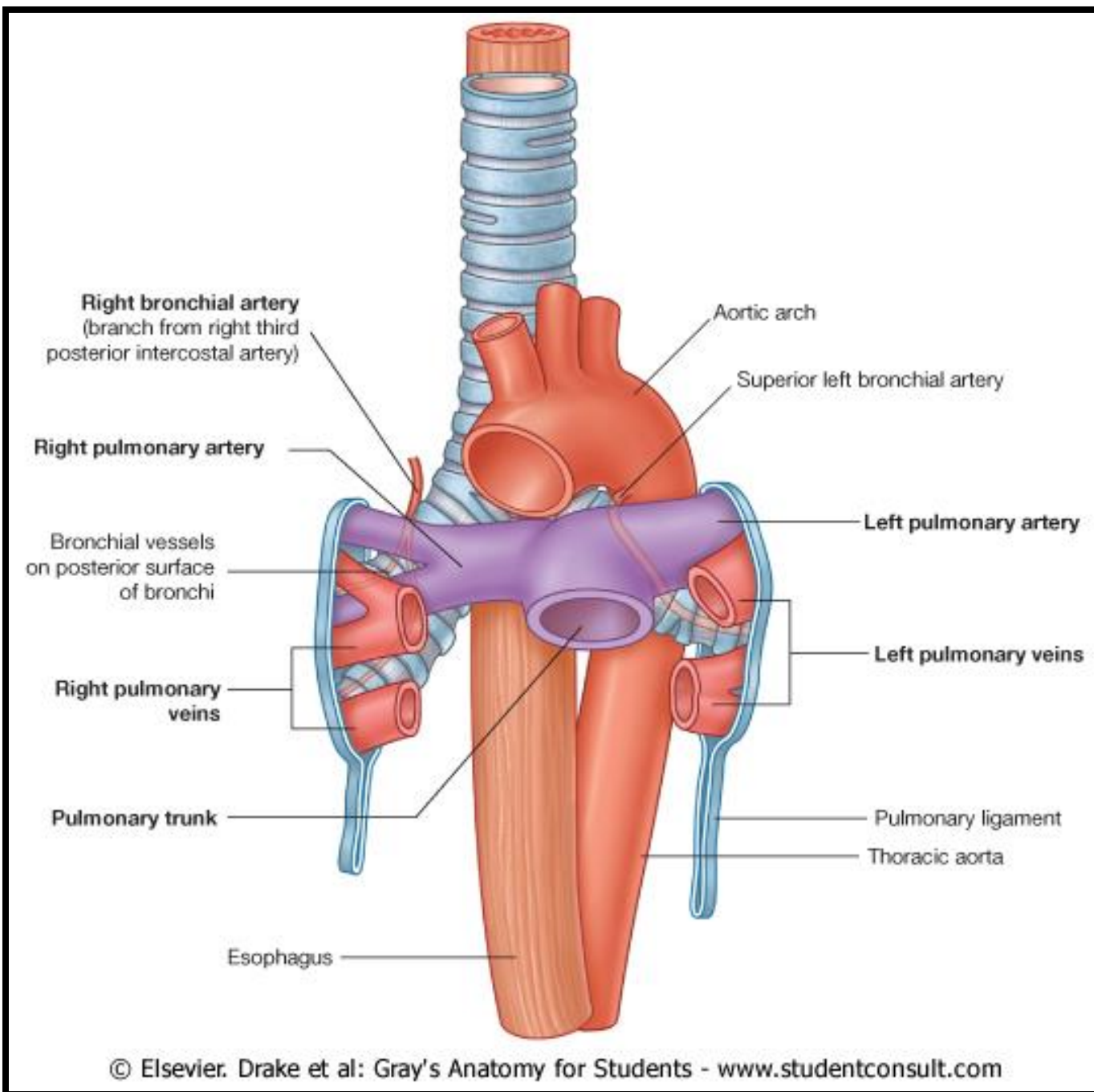
Root and hilum

28

- The **root** of each lung is collection of **structures** that together attach the lung to structures in the mediastinum.
- the **hilum**, is the **region** in the lung where structures enter and leave.

Within each root are:

- **Pulmonary artery**
- **Two pulmonary veins**
- **Main bronchus**
- **Bronchial vessels**
- **Nerves**
- **Lymphatics**



The pulmonary ligament

30

- **It is a thin fold of pleura projects inferiorly from the root of the lung.**

**Think about
this:
What is the
benefit of
the
pulmonary
ligament?**

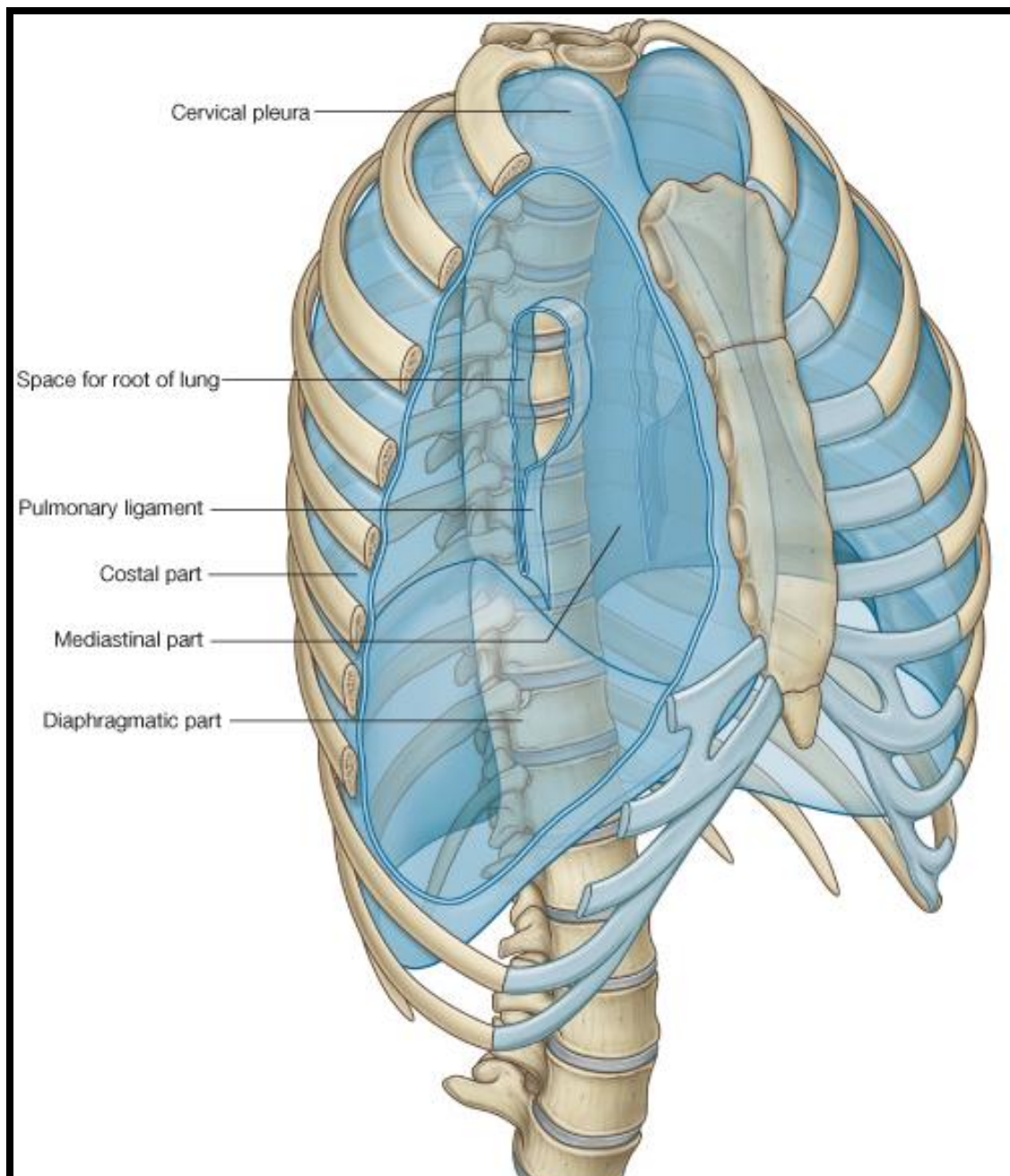


Image from: Richard L.Drake, Wayne Vogl, Adam W.M.Mitchell, GRAYS anatomy for students, Elsevier Inc. 2007

Differentiating Right from Left Lungs

32

- **Identification of parts of the lung is the first step.**

- **Apex.**

- **Base: deep concavity.**

- **Borders :**

- **Anterior : sharp.**

- **Posterior : rounded.**

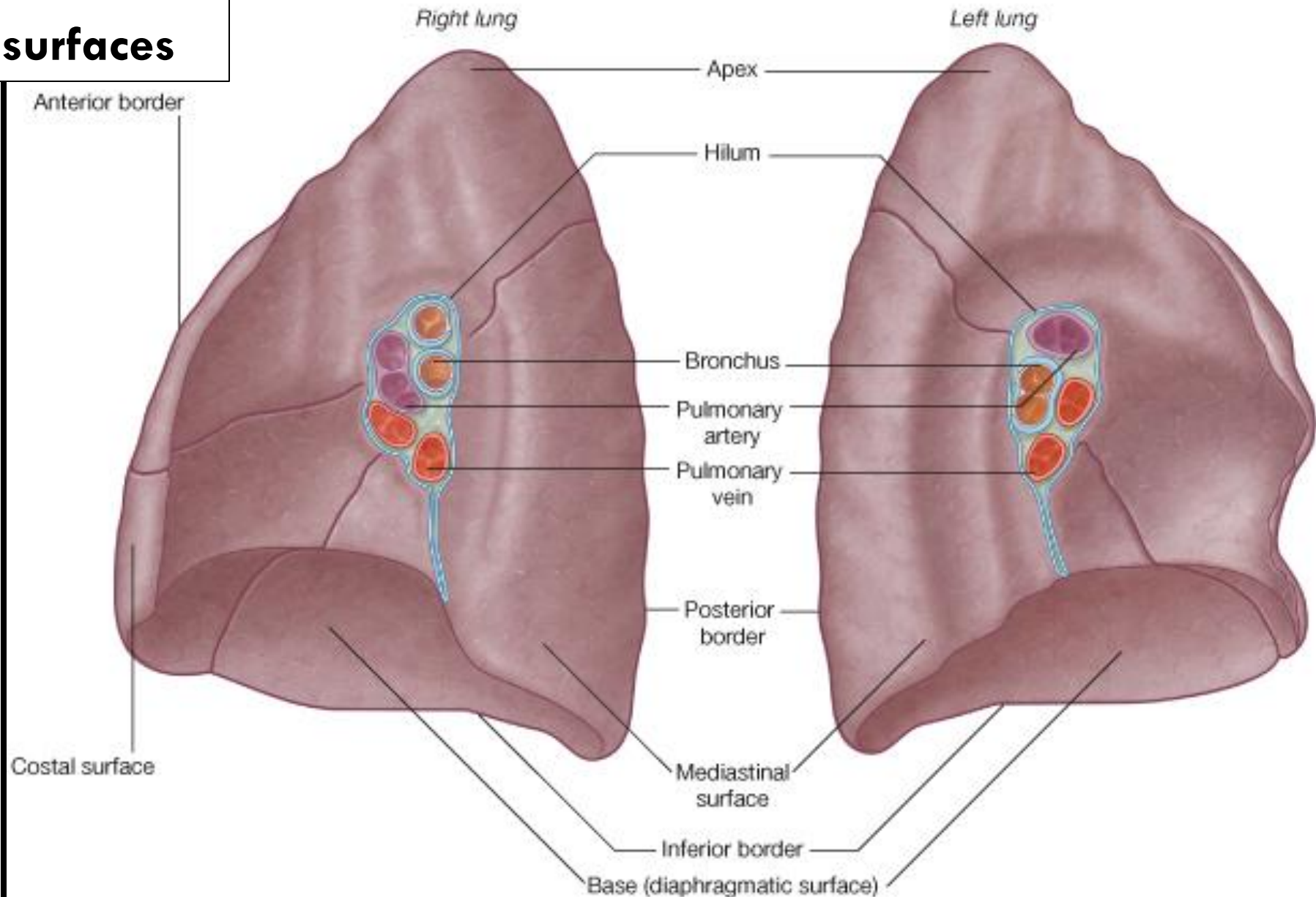
- **Surfaces :**

- **Lateral (Costal)**

- **Medial (Mediastinal)**

- **Inferior (Diaphragmatic)**

Borders and surfaces



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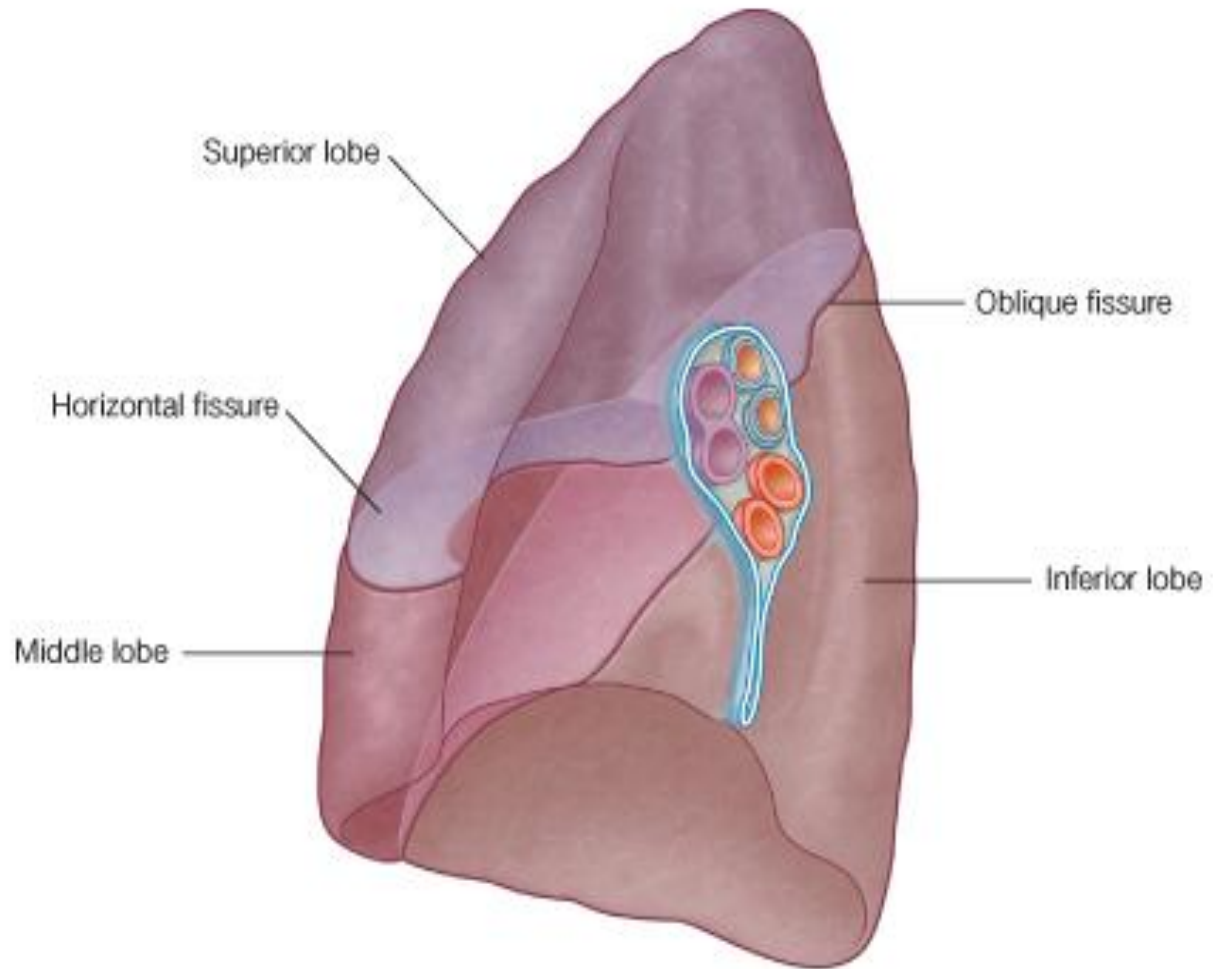
Lobes and fissures of The Right Lung

Lobes:

- Superior lobe.
- Inferior lobe.
- Middle lobe.

Fissures:

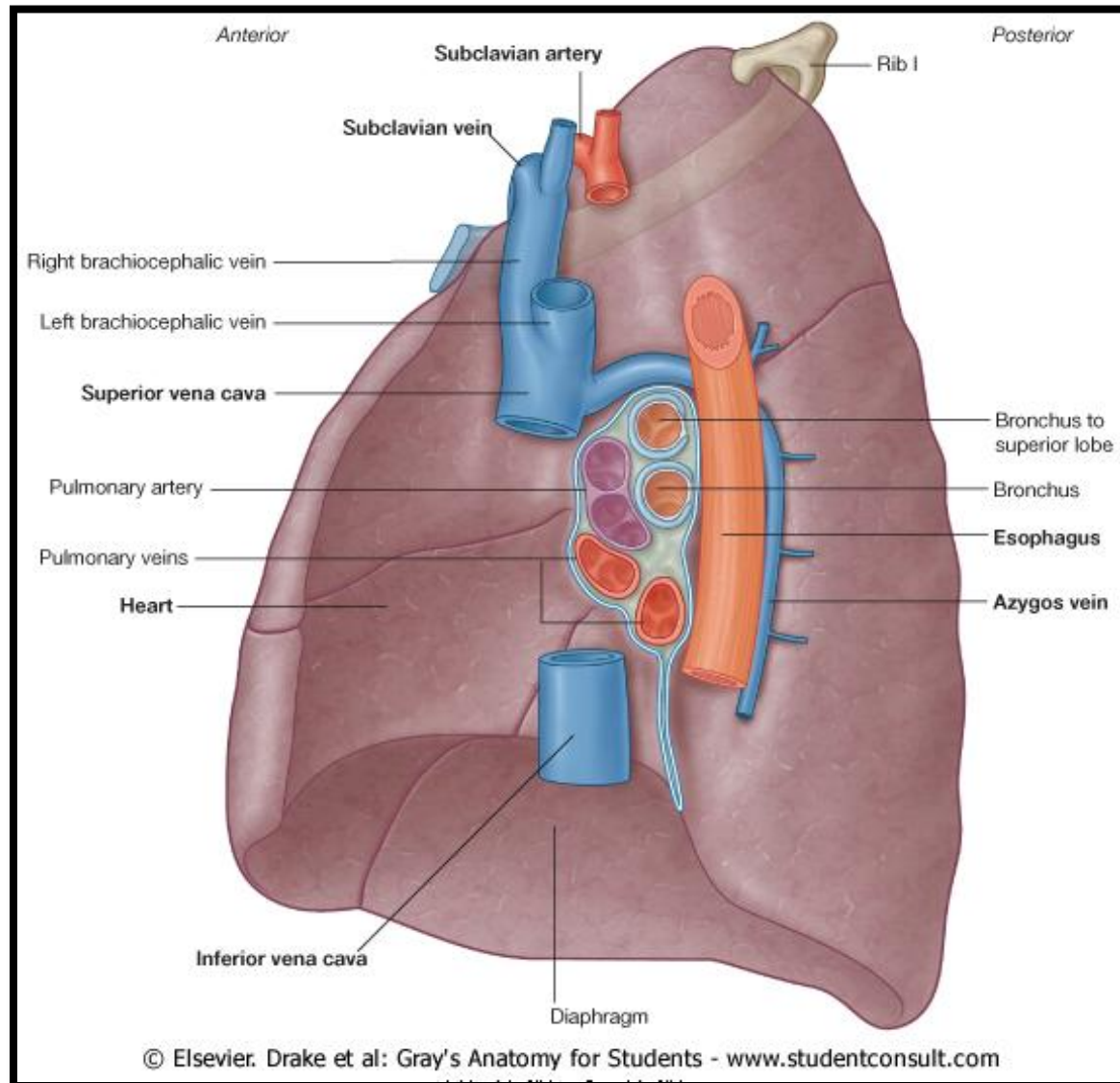
- Horizontal.
- Oblique.



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Impressions Of The Right Lung

- Impressions are for:
 - ▣ Superior vena cava.
 - ▣ Arch of azygos.
 - ▣ Esophagus.
 - ▣ First rib.
 - ▣ The heart.



Impressions Of The Right Lung

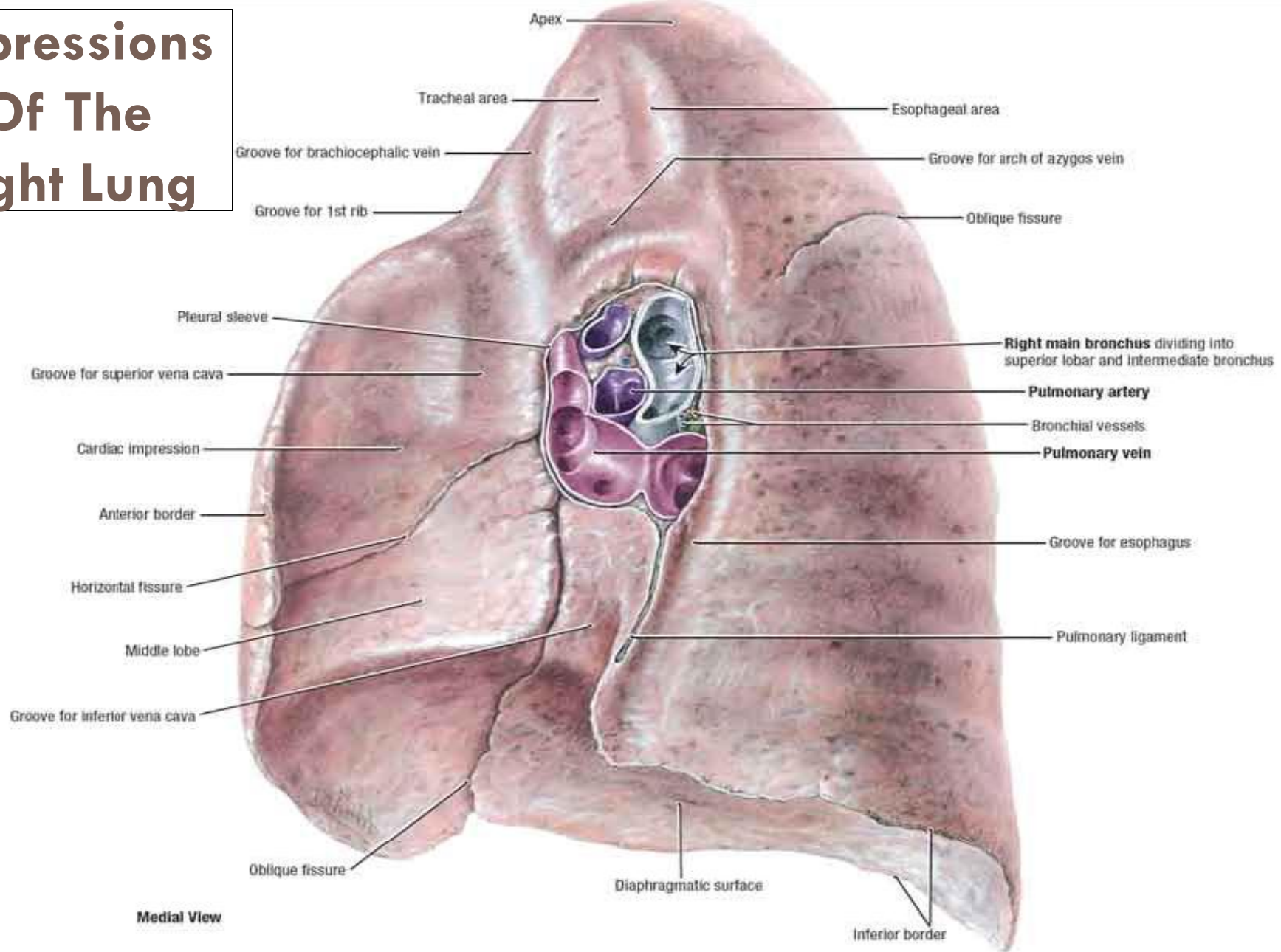
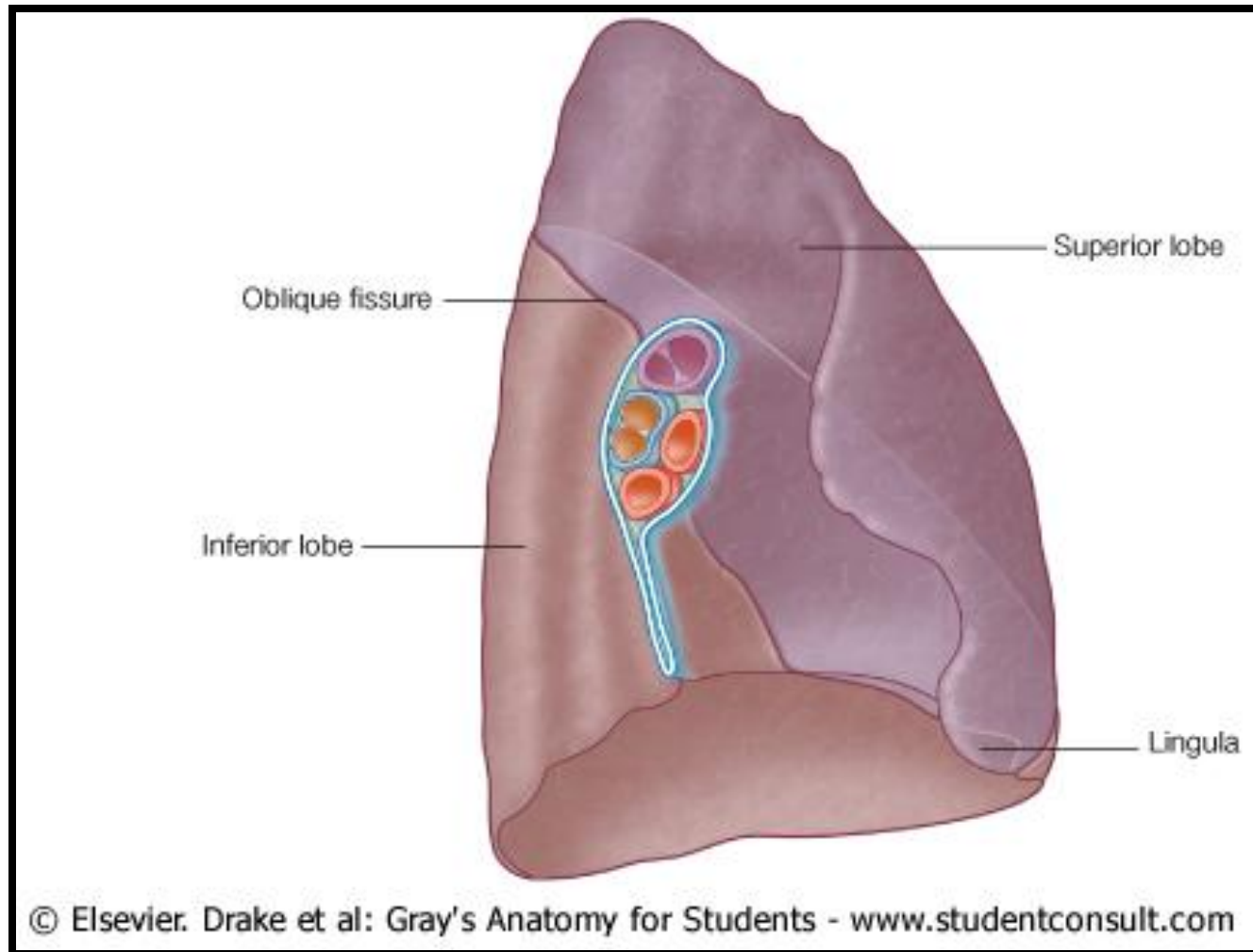


Image from: Moore, Keith L.; Dalley, Arthur F, Clinically Oriented Anatomy, 5th Ed. Lippincott Williams & Wilkins; 2006.

Lobes Of The Left Lung

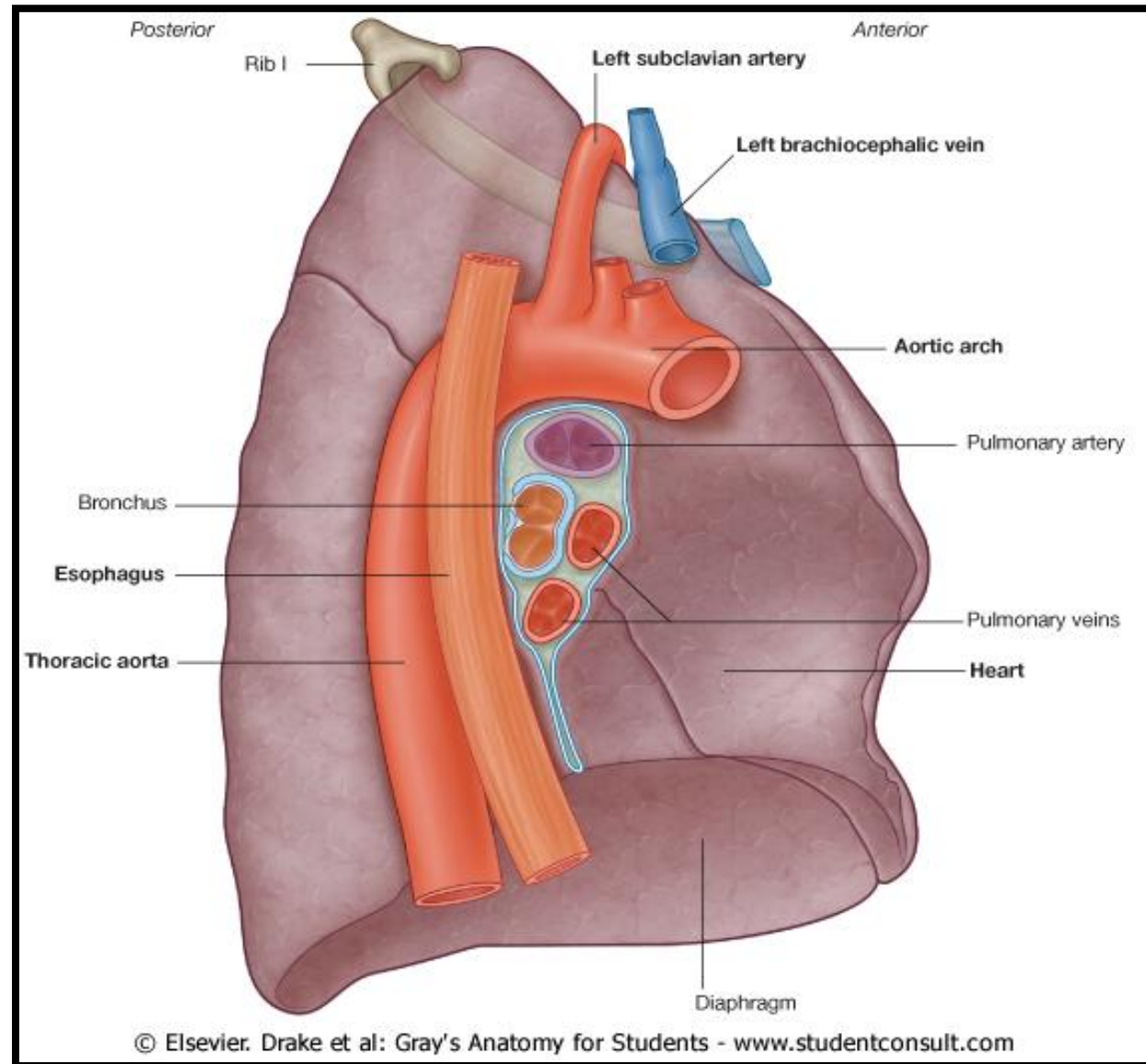
- **Lobes:**
 - ▣ Superior lobe.
 - ▣ Inferior lobe.
- **Fissures:**
 - ▣ Oblique.



Impressions Of The Left Lung

□ Impressions are for:

- Arch of the aorta.
- Esophagus.
- First rib.
- The heart.



Impressions Of The Left Lung

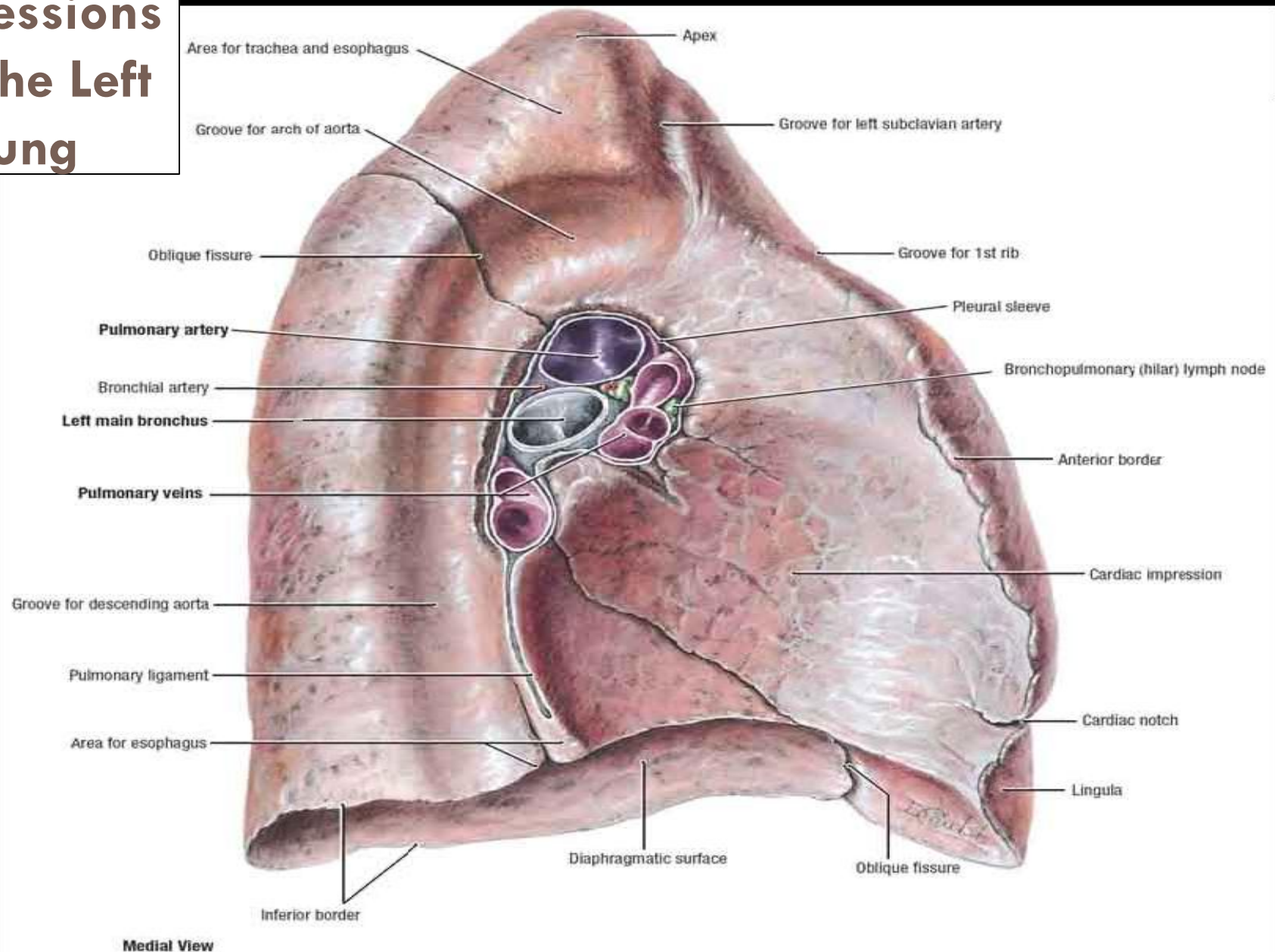
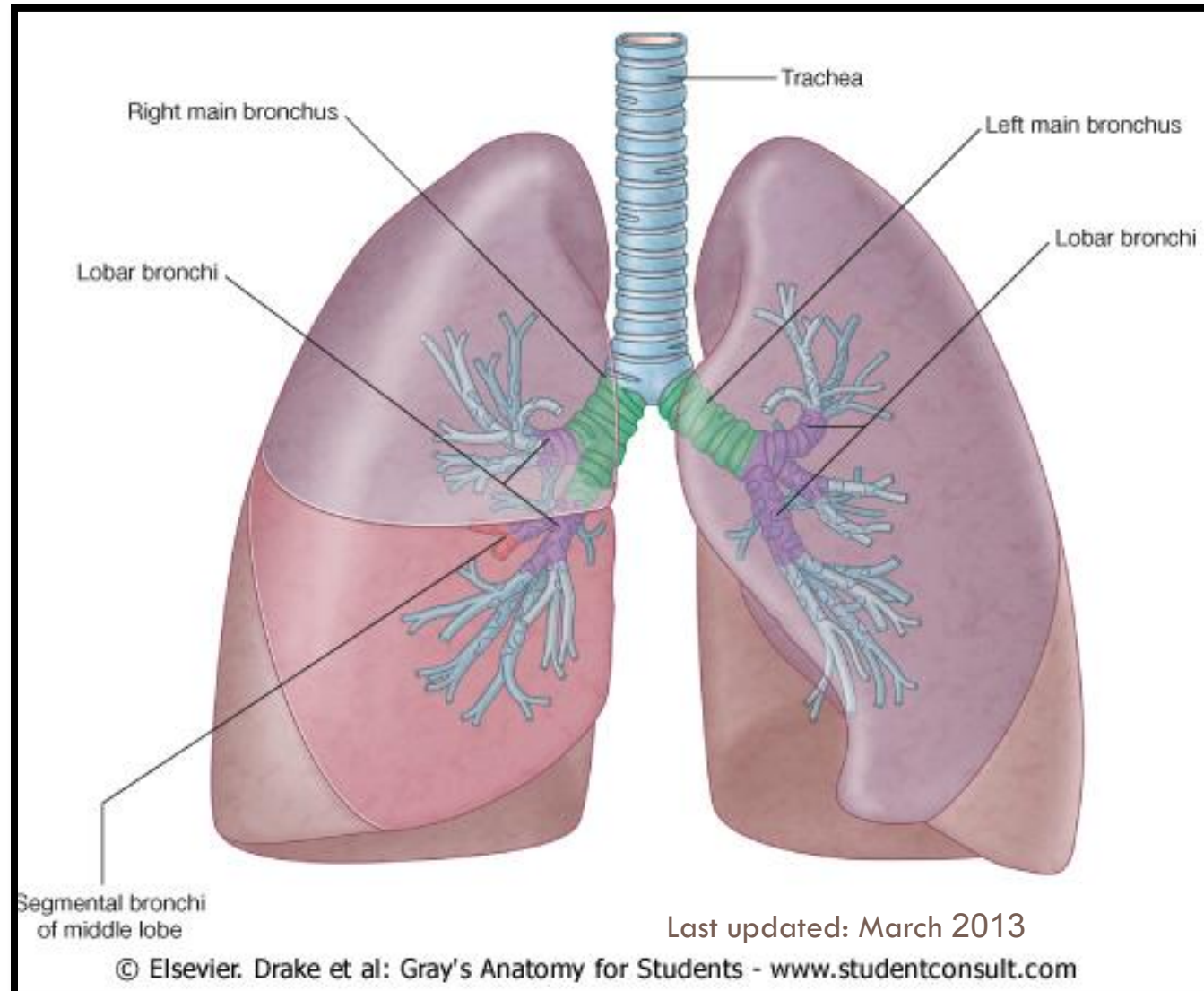


Image from: Moore, Keith L.; Dalley, Arthur F, Clinically Oriented Anatomy, 5th Ed. Lippincott Williams & Wilkins; 2006.

Bronchial Tree

40

- **Trachea.**
- **Main (principle) bronchi.**
- **Lobar bronchi.**
- **Sgmental bronchi.**



Clinical note : Aspiration of Foreign Bodies

41

- ❑ **The right bronchus is wider and shorter and runs more vertically than the left bronchus.**
- ❑ **Foreign material is more likely to enter and lodge in right bronchus or one of its branches.**

Blood Supply of The Lungs

42

- **Bronchial arteries :**
 - For the bronchial tree.
- **Pulmonary arteries :**
 - Gas exchange.

Innervation (Autonomic)

43

- **Sympathetic :**
 - **From sympathetic chain.**
- **Parasympathetic:**
 - **From vagus nerve.**

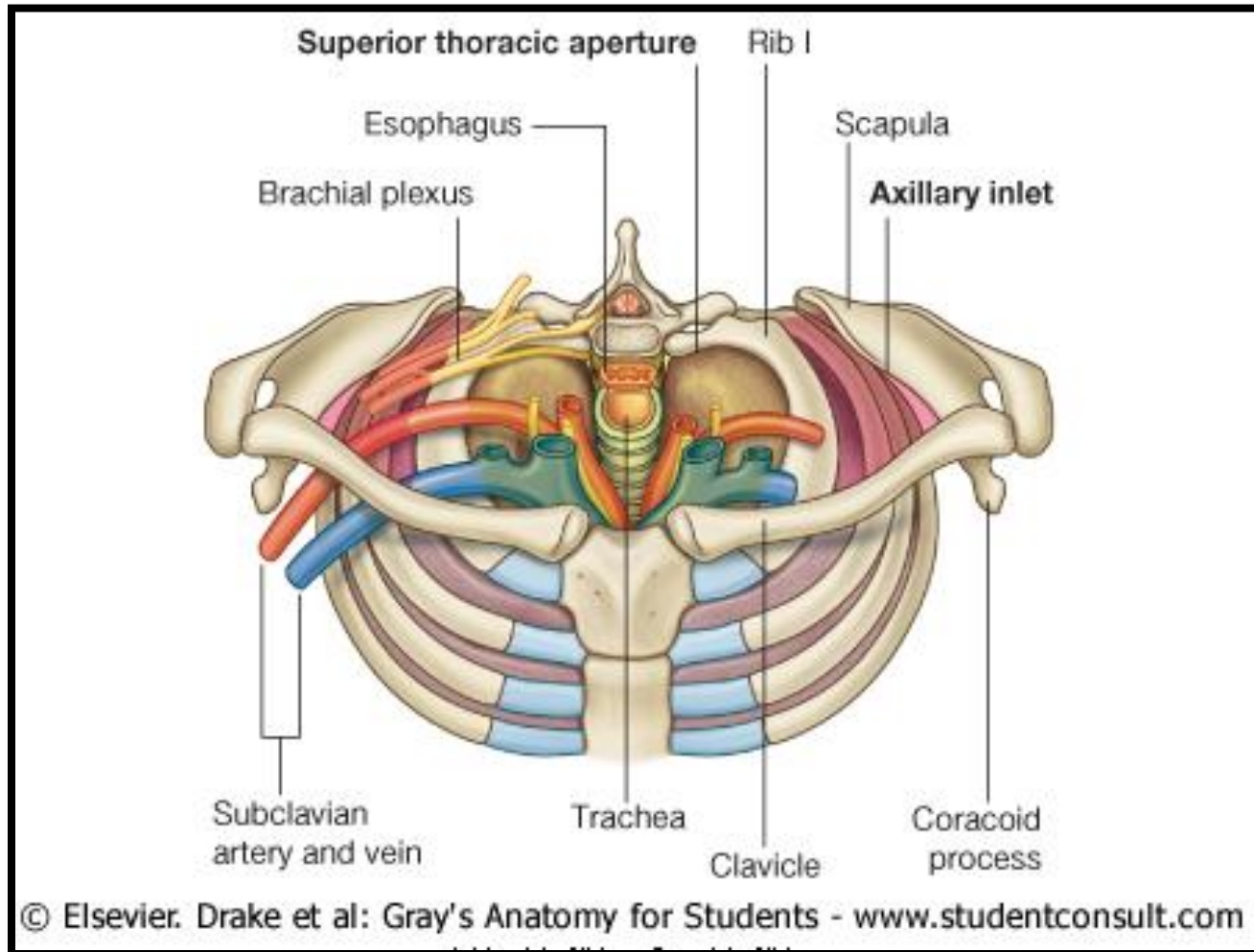
Clinical note: Auscultation of the Lungs

44

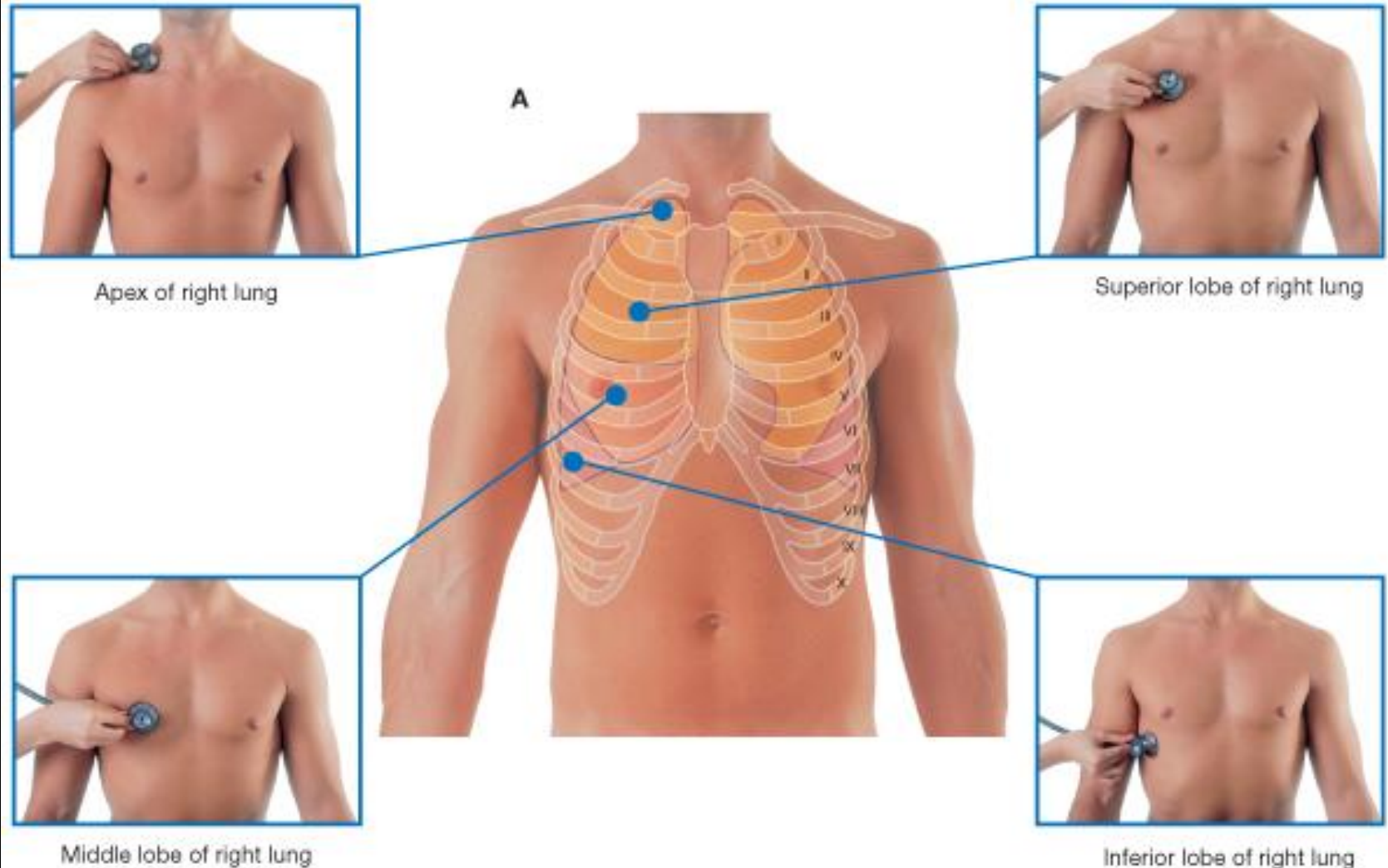
- ❑ It is listening to lung sounds with a stethoscope.
- ❑ It assesses airflow through the tracheobronchial tree into the lobes of the lung.

Auscultation should always include the root of the neck where the apices of the lungs are located

Anatomical relation: apex of the lung and root of the neck

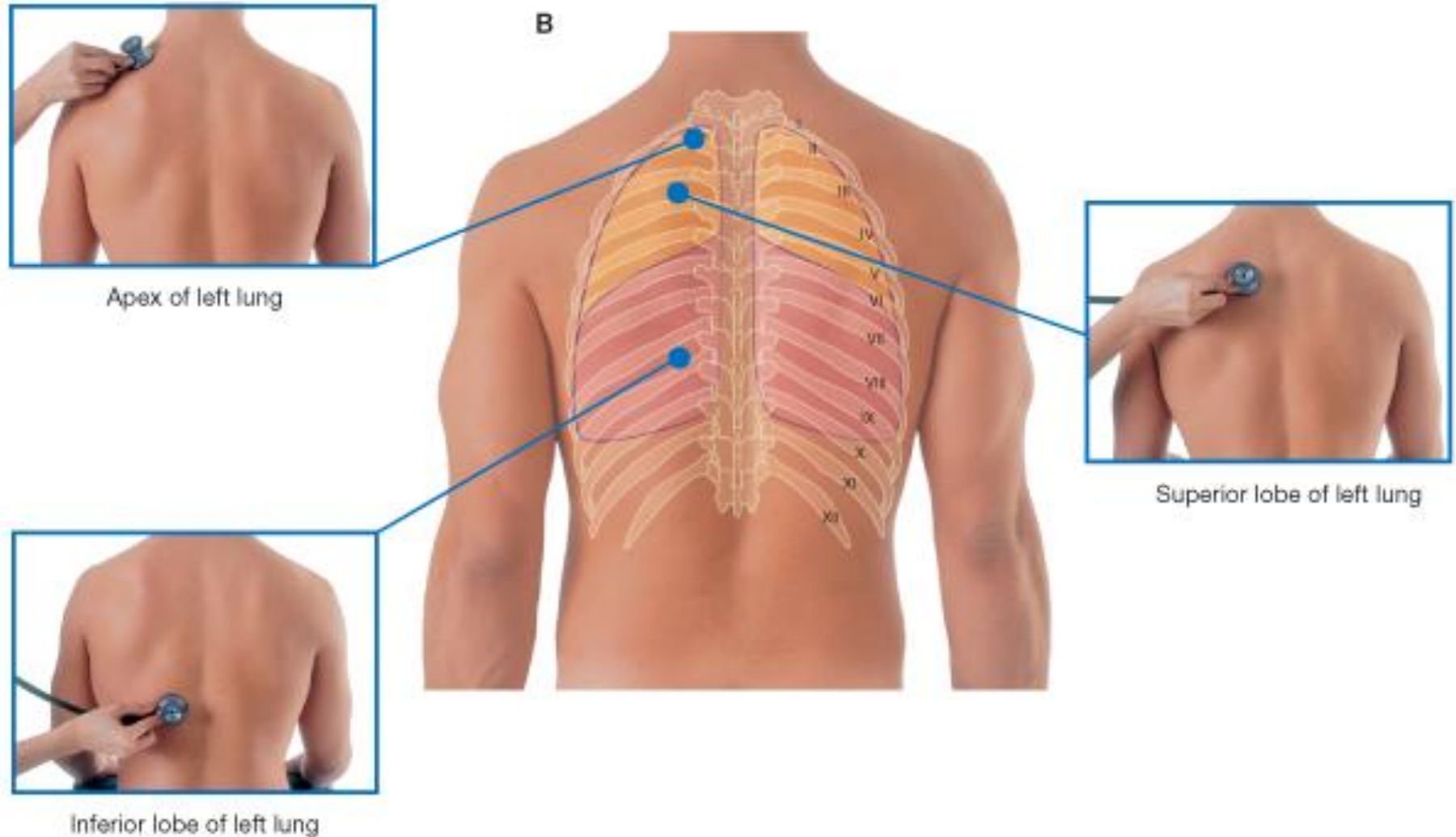


Surface anatomy: areas for auscultation (anterior)



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Surface anatomy: areas for auscultation (anterior)



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Clinical note: Percussion of the Thorax

48

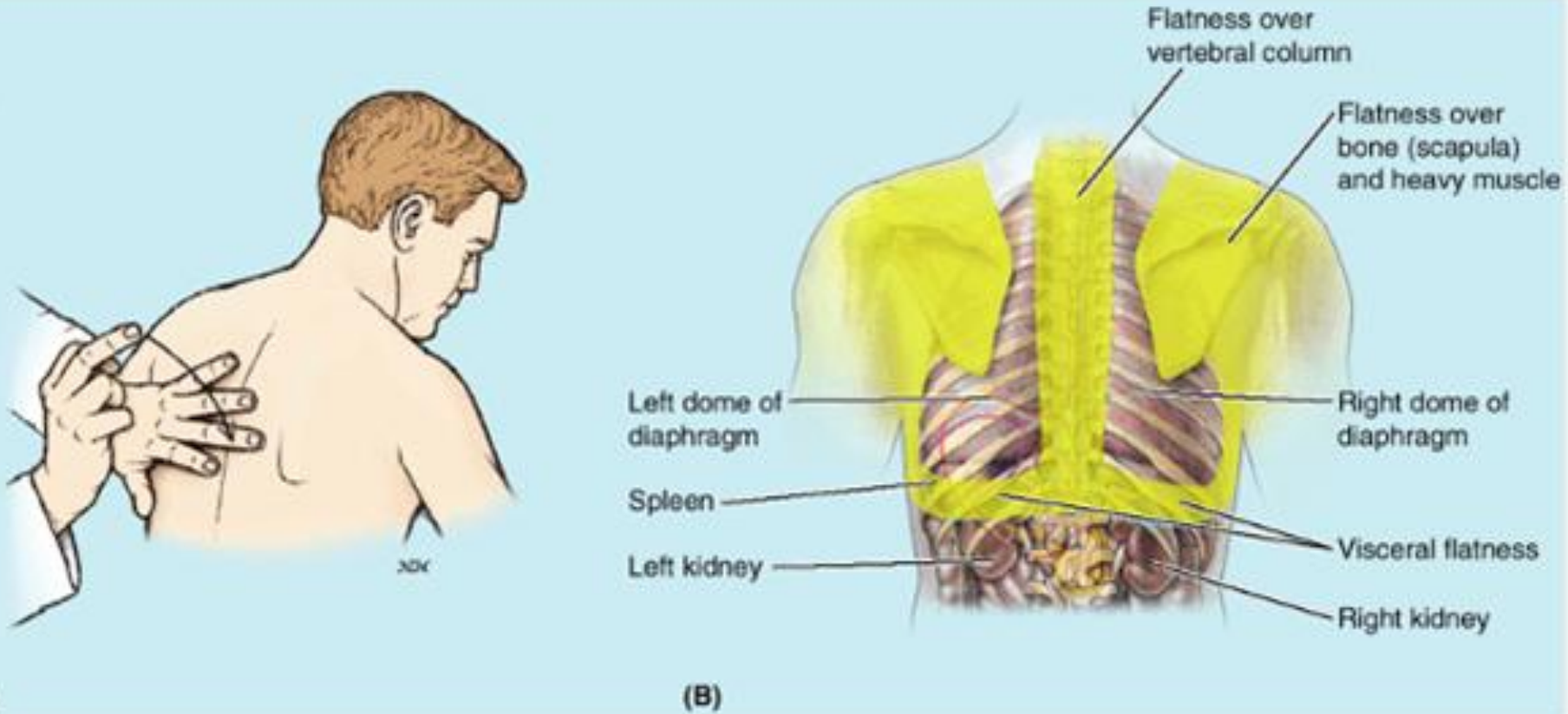


Image from: Moore, Keith L.; Dalley, Arthur F, Clinically Oriented Anatomy, 5th Ed. Lippincott Williams & Wilkins; 2006.

Clinical note: Percussion of the Thorax

49

- ❑ It is tapping the thorax over the lungs with the fingers to detect sounds in the lungs.
- ❑ Percussion helps establish whether the underlying tissues are:
 - ❑ Air filled (resonant sound).
 - ❑ Fluid filled (dull sound).
 - ❑ Or solid (flat sound).

Percussion should always include the root of the neck where the apices of the lungs are located

X-Ray: collapsed lung



Image from: Abraham's et al , McMinn clinical atlas.

Summary

Lecture's map

□ Pleura:

- ▣ Definition and structure.
- ▣ Layers.
- ▣ Parts.
- ▣ Innervation.
- ▣ Function.
- ▣ Surface marking.

□ Lungs:

- ▣ Roots of the lung.
- ▣ Borders and surfaces.
- ▣ Lobes and impressions.
- ▣ Bronchial tree.
- ▣ Blood supply.
- ▣ Innervation.

Please try to answer this question

52

- ☐ **With a patient in the standing position, fluid in the left pleural cavity tends to gravitate down to the:**
- A. Oblique Fissure**
 - B. Cardiac Notch.**
 - C. Costomediastinal Recess.**
 - D. Horizontal Fissure.**
 - E. Costodiaphragmatic Recess**

Please try to answer this question

53

- ❑ Which of the following statements concerning the lungs is correct?
- A. The left lung consists of three lobes.
 - B. The parietal pleurae are insensitive to pain.
 - C. The vagus nerve passes anterior to the lung root.
 - D. The right lung is in direct contact with the arch of the aorta.
 - E. Inhaled foreign bodies most frequently enter the right lung.

References

54

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- **Acland's** video Atlas of Human Anatomy, Robert D.Acland M.D , FRCS.
- Abraham's et al , **McMinn** clinical atlas.

**Our deepest fear is not that we are
inadequate.**

**Our greatest fear is that we are powerful
beyond measure.**

**It is our light, not our darkness that most
frightens us.**

**We ask ourselves: who am I to be brilliant,
gorgeous, talented and fabulous?**

Actually, who are you not to be?

“Marianne Williamson”